

## Re: Simple mosfet question

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- *From:* default <default@xxxxxxxxxxxxxx>
  - *Date:* Thu, 02 Aug 2007 12:50:24 -0400
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On Thu, 02 Aug 2007 15:18:21 -0000, Andrew <xxragexx@xxxxxxxxxx> wrote:

I have a simple circuit where I want to convert a digital input from 0-5V to an inverted signal from 0-12V. ie, 0V into the circuit = 12V out, and 5V into the circuit = 0V out.

I don't have the means to get a schematic up, but I've tried to draw it with text below (but it probably won't show up right), so I will describe the simple circuit and I think it will be clear:

There is a 2N7000 N-ch mosfet transistor, with the source tied to ground. The gate is tied directly to the input. The drain is tied to a resistor, 10k, and the other side of the 10k resistor is tied to a battery, +12V. The output is connected to the drain, and is used to feed the clock inputs of 2 CMOS ICs. There is a 470pF filtering capacitor tied from the output to ground.

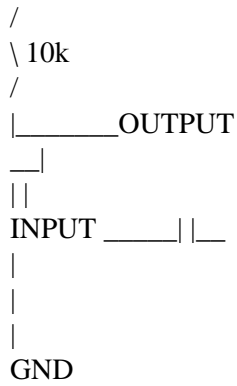
My question is, can anyone see how this circuit would blow the transistor? Is this an OK way to hook it up? Should I maybe add another 10k resistor between drain and output (before the cap) to better protect the transistor? I realize that doing this would bring the output voltage down very slightly, but that's fine if it is needed to protect the transistor.

I'm asking because I've hooked up the circuit more than a few times, and it always works at first / for a while, but sometimes the transistor blows unexpectedly and I don't know why yet. I think it is because I was damaging the transistor during install (with ESD, I was not using protection at the time, but I learned my lesson!), but I want to make sure it isn't actually a circuit problem too.

Sorry that I can't get a schematic up, I don't have a place to upload files while I'm at work. I hope I have made it clear enough :)

+12V  
|  
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mosfets are very sensitive to gate drive and spurious signals / static electricity etc.. A small transient in the gate lead can eat a mosfet where a BJT will shrug it off. You are doing something that kills the transistor – bread boarding? Keep the gate lead short to minimize inductance. Protect the gate and source/drain if there is an inductance in the load. Use a scope and watch the transients.

Look at the data sheet for the 7000 – particularly look at the safe operating area and you see how fragile they can be.

A good source for the use of mosfets:

<http://www.irf.com/technical-info/appnotes/an-937.pdf>

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